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TRACHEOTOMY IN CROUP.[1]

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THE mortality in croup is so great, and the results of all kinds of treatment are often so unsatisfactory, that many members of the profession entertain the opinion, that all their efforts are powerless to save life, or to give even temporary relief. This statement applies especially to the operation of tracheotomy. Always an anxious, and oftentimes a difficult one to perform, requiring the most intelligent, skilful, and unremitting care in the after-treatment, yet it has given more relief, and saved more lives in pseudo-membranous laryngitis than all other remedial measures. Not infrequently the operator will meet with accidents, and occasionally may lose a patient upon the table, yet he may rest assured that, in the long run, he will do more good than harm, and that he will save some lives which would probably have been lost had he not interfered.

It will be the object of this paper to show from the records of the Boston City Hospital for the past twenty years, and from other sources, that the results of this operation are not as unsatisfactory as has been supposed; that surgical treatment offers a better prospect of success, than any other; that a fair proportion of the patients can be saved; and that many

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more can be greatly relieved by a timely resort to this measure.

The term croup is used here in its generic sense, as meaning an acute laryngeal obstruction to respiration, due to the presence of a false membrane.

Two varieties come to the notice of the surgeon: the membranous and the diphtheritic. The false croup so common in young children can usually be recognized from the fact that it occurs suddenly, and in the night, is paroxysmal, of short duration, less severe in character, yields readily to treatment, and seldom, if ever, terminates fatally. Acute catarrhal laryngitis of adults is not a common affection. The symptoms resemble those of the membranous disease, and may require surgical interference.

As a correct diagnosis of the two kinds of laryngitis under consideration is thought by many to be of great importance in regard to the prognosis and treatment, I may be pardoned a few words upon the subject.

The profession has always been, and still is, divided upon the question of the identity of membranous and diphtheritic croup; one portion claiming that the former is purely a local, and the latter a constitutional disease; while the other portion, with equal tenacity, assert that they are essentially one and the same affection, under different manifestations.

The writer takes the ground that membranous croup is a distinct and separate disease from diphtheria, for the following reasons: It is not contagious; it is a local lesion confined to the air-passages; it causes death by mechanical means; it never results in systemic infection; it has never disappeared from notice for long periods of time, and over a large extent of territory, as has diphtheria.

Much of the confusion that exists upon this question is due to the fact that authorities are not

agreed as to what group of symptoms shall constitute either malady. Dyspnœa is the prominent and important symptom common to both. Glandular enlargements, nasal discharges, albuminuria, and paralysis are the distinguishing features of diphtheria, and cases presenting any of these characteristics should not be called membranous croup.

The older members of the profession, who have had opportunities of studying croup at a period when diphtheria was unknown in this country, and whose opinions are entitled to the greatest respect, recognize the marked clinical distinctions between the two affections. The writers of that time generally deny the existence of contagion, and say nothing about glandular complications, or other symptoms of blood-poisoning. The croup of these days was a purely suffocative affection, and it is not reasonable to suppose that a disease of so grave a character as diphtheria should have shown itself in this country for seventy-five years as simply a local, non-contagious laryngitis, and not have presented its most prominent feature, namely, septicæmia.

It is stated by some authorities that an exudation upon the fauces necessarily indicates diphtheria; and that the cervical glands are not implicated while the membrane is confined to the larynx, because of the peculiar distribution of the lymphatics. Dr. John Ware, who wrote a most admirable monograph on croup in 1842, long before diphtheria had made its reappearance in America, reports the presence of an exudation in the pharynx in seventy-four out of seventy-five cases examined with reference to that point. He says nothing of enlarged glands, nasal discharge, or other septic symptoms, as so keen and reliable an observer would certainly have done, had they existed. It is not consistent with the history of diphtheria, that it should have occurred so many

times in the practice of Dr. Ware and his contemporaries, without presenting some of its constitutional symptoms.

Fatal cases of diphtheria in which the larynx is not affected are common. Idiopathic croup, on the contrary, is invariably a laryngeal disease, is confined to the air-passages, and causes death by suffocation. In short, membranous croup is simply that, and nothing else; while diphtheria, though occasionally attended with croup, is always something more.

Although I am aware of the fact that a majority of the cases of croup of late years are diphtheritic, and that in exceptional cases it may be difficult to make a differential diagnosis, yet I submit the following statements as the result of my experience and study of the subject:

First. There is an acute, non-contagious disease of the larynx, characterized by the presence of false membrane, which causes the principal symptom, dyspnœa; and often destroys life. This is membranous, or idiopathic croup, and is of rare occurrence.

Second. There is an acute, contagious affection presenting a similar exudation in the larynx and other localities, accompanied by symptoms of blood-poisoning, such as enlarged glands, nasal discharge, albuminuria, debility, and coma. This is diphtheritic or secondary croup. For twenty years it has been the prevailing type in the United States, and it is very fatal.

Third. There are occasionally fatal cases of acute laryngeal stenosis, in which no membrane is seen during life or at the autopsy. As thickening and œdema of the mucous membrane are present in these cases, they are probably of the same nature, and require the same treatment, as the membranous form.

But while a doubt may exist in the minds of many as to the character of these affections, there can be none as to the duty of the practitioner. It is for him to study the condition of the patient, rather than the name of his malady. The treatment should be based upon the symptoms presented, and not upon a disputed theory of the nature of his disease.

Surgical interference is often necessary to relieve the difficulty in breathing, and, in the opinion of the writer, the cases of probable membranous laryngitis, attended with severe and increasing dyspnœa of over twenty-four hours' duration, are rare, in which the patient, whatever may be his general condition, should be refused the benefit that may result from opening the trachea. It is of the first importance that the mechanical obstruction to respiration should be removed at the earliest moment possible.

Before resorting to any operative measures, it is always well to form some idea of the probable result of the case, if it be allowed to proceed without them. The evidence which I have been able to gather touching the results of the medical treatment of croup, is somewhat conflicting, as will be seen by the following remarks :

Meigs and Pepper report fifteen spontaneous recoveries in thirty-five cases of pseudo-membranous laryngitis, mostly of the diphtheritic variety. Dr. J. Lewis Smith, in twenty-one cases of diphtheritic croup, has had seven successful results without an operation. In speaking of idiopathic croup, Dr. Agnew says : "I am of opinion that, with American practitioners, the recoveries without operation are at least fifty per cent." Dr. Ware's statistics show that thirty cases out of thirty-three, treated by the expectant method, terminated fatally. He did not make use of the depressing treatment, which was in

vogue at that time, but relied upon opium, calomel, and steam.

Dr. Cheever, Professor of Surgery at Harvard University, writes as follows: "After reflection, I cannot recall a case of membranous laryngitis that I have known to recover without tracheotomy."

As the result of written inquiries of about thirty prominent practitioners in New England, I have heard of the recovery of between thirty and forty cases under medical treatment, which is a small proportion of cases observed. One physician reports seven cases; another four, another three; several had never seen a case of spontaneous recovery, and they all agree that such results are rare. These gentlemen have been in practice for a period of from thirty to sixty years.

Upwards of four hundred cases of diphtheria have been admitted to the Boston City Hospital during the past eight years. Forty of these patients, suffering from undoubted diphtheritic croup, as indicated by the presence of membrane, glandular enlargements, dyspnœa, and cyanosis, received medical treatment only, and every one died. *Not a single case of pseudo-membranous laryngitis has ever recovered in this hospital without an operation.* In the light of such evidence, I can but conclude that the expectant plan of treating croup is far from satisfactory. On the other hand, the results of the operative treatment are much more encouraging.

The formidable array of statistics given to the profession through the arduous labors of Cohen, Mastin, and others, comprising over eleven thousand operations as collated by Dr. Agnew, prove that from one-quarter to one-third of the cases of tracheotomized croup recover. Cohen reports one hundred and ten successful results out of one hundred and sixty-six cases, mostly in private practice. Drs. Jacobi, Voss,

Krackowizer, and von Roth saved fifty out of two hundred and thirteen. Of seventy-nine operations performed by surgeons in Philadelphia, nineteen were successful. Dr. John H. Ripley, of New York, has had thirty favorable results, in one hundred operations. The writer has performed tracheotomy sixty-two times for croup, with twenty recoveries. Twenty-one of these operations were performed in 1883, of which ten were successful. Fifteen cases were in private practice; only one recovered.

Tracheotomy for this disease has been performed one hundred and eighteen times at the Boston City Hospital during the past twenty years. Thirty-nine, or one in three, were successful. That the cases were not selected, is conclusively shown by the fact that three patients died during the operation from shock and exhaustion, not from hemorrhage; thirty-four died within twenty-four hours; and fifty-six, or more than one-half of the fatal cases, within forty-eight hours. Four, if not five, of the successful cases were practically moribund at the time of the operation.

While the records are not sufficiently complete to enable me to give the exact number belonging to each class, yet the diphtheritic variety largely predominated.

The ages of these patients ranged from nine months to forty-one years. The youngest to recover was eleven months; the oldest, sixteen years. Four aged two years, and five aged three years got well.

Membrane was visible in the fauces or trachea in a large proportion of both the successful and unsuccessful cases. Its absence was noted in only three of each class. It need not be said, that in every instance there was present severe, constant, and increasing dyspnœa, exhausting the strength and threatening suffocation.

As a rule, the operation was followed by marked

temporary relief; and in many of the fatal cases the difficulty in respiration did not return until the patient was comatose from blood-poisoning, and hence beyond suffering. In a few instances the smaller air-tubes were so extensively invaded by the deposit that no benefit resulted from the procedure.

A large majority of the patients had received appropriate medical treatment previous to entering the hospital, and were only sent there when it had become evident that an operation was the only alternative. It follows, of course, that many of the cases were in a most deplorable condition. It is the rule with us, however, to open the trachea at once, if there is the least prospect that the patient will survive it, and in more than one instance the result has justified the practice. For example, a child came under my care last winter, suffering from malignant diphtheritic croup. There were present faucial exudations, glandular enlargements, foul nasal discharge, dyspnœa, cyanosis, and impending coma. There did not seem to be the slightest chance for success, yet, after some hesitation, the operation was performed. Immediate and entire relief followed, and the child recovered. So many of these desperate cases have been saved at the last moment by different operators, even resuscitation having been followed by success, that a resort to this measure is advisable under almost any circumstances.

In view of the natural antipathy entertained by the public against a surgical operation, it is fair to conclude that few, if any, patients are subjected to this one, until a reasonable trial of other measures has been made; and hence it must be the rare exception that a tracheotomized patient would have recovered without it.

Again, taking into consideration the fatal character

of the affection, the unsatisfactory results of the expectant treatment, and the impossibility of determining the cases which would recover spontaneously, a resort to this measure is justifiable in urgent cases, even if the diagnosis is doubtful. Waiting for a clear diagnosis is, in some instances, simply waiting for an autopsy.

The advantages of an early tracheotomy are, that the patient is better able to undergo it; the strength is preserved, more nourishment can be taken, and more sleep secured; time is gained, in which it may be hoped that the disease will run its course; and finally, it seems reasonable to suppose, as is claimed by some writers, that it tends to prevent those pulmonary complications so common in the later stages of the disease. Other things being equal, early operations will probably give better results than late ones.

Little need be said here as to the best method of performing tracheotomy. Every operator of much experience gradually acquires one of his own. I learned long ago to be chary of the use of ether in these cases, as it may impede or suspend the respiration, and it often increases the shock and prostration. The pain is not very severe, and usually ceases as soon as the skin is divided. With good assistants, the operation can be safely performed in a majority of instances without an anæsthetic.

Having performed the high and low operation many times, I have come to prefer the former because the trachea is more easily reached, there is less danger of hemorrhage, and it is more easily controlled, there is less liability to abscess and emphysema, and because nothing is gained by opening the trachea an inch or so lower, as the obstruction, if present, is at or below the bifurcation. I do not hesitate to divide the cricoid cartilage, or the isthmus of the thyroid gland, and have never seen any harm

result from so doing. The trachea is secured with a tenaculum before being incised, thus avoiding the danger of missing it, or of losing sight of the opening, mishaps which are embarrassing, and not uncommon. A moderate sized silver tube with a movable shoulder is always used. This has been worn in the above cases for periods varying from five days to two or three years. None of the patients have been compelled to wear it permanently.

I have found the most satisfactory method of getting rid of the tube to be as follows:

About a week after the operation, if the respiration is free and easy, the canula is quietly removed, and the patient is left undisturbed. No trials are made to ascertain if he can breathe through the larynx. As the wound in the trachea contracts, respiration by the natural channel is gradually reëstablished.

I have never seen a patient die from hemorrhage during this operation, either before or after the trachea had been opened, and I do not think it has ever occurred at the City Hospital. Should respiration become impeded by the presence of blood in the bronchi, we are directed by some authorities to apply our mouth to the wound, and suck it out, or to do so by means of a catheter, or other tube.

Nature gets rid of offending substances in the air-passages, by means of forcible expirations, or cough, and we should try to imitate her. The writer has been called upon to clear the bronchial tubes of blood under the following circumstances: A young man was brought to the hospital, who had shot himself in the mouth, the ball lodging in the back of the neck to the left of the spinous processes. The patient having been etherized, an incision was made, and the bullet was readily extracted. At that moment, however, his face became livid, and he ceased to breathe. The trachea was immediately opened, a large catheter

introduced, and air was forcibly blown into the lungs, with the result of driving out a large quantity of blood.[1] Respiration was soon reëstablished, and consciousness returned. The ease and rapidity with which the blood was ejected from the bronchial tubes was as surprising as it was satisfactory.

It is a physical impossibility to suck anything out of the trachea, unless air has a free ingress to supply the vacuum. Forcible distention of the lungs through a tube is attended by a return current of air, the velocity of which is in direct ratio to the power exerted. This effect is much more readily obtained by strongly inflating the lungs, than by suction.

Furthermore, in cases of croup, whether contagious or not, no one is called upon to risk his life in trying to suck out the contents of the bronchial tubes. Too many valuable lives have been sacrificed in that way, and in view of the fact that there are other and better methods of accomplishing the object, the plan should be totally abandoned. Forcing air into the lungs from the mouth of the operator is rapid, efficacious, and comparatively safe; trying to empty the bronchial tubes by suction is always dangerous, and rarely successful.

Next to nourishment, I consider steam to be the most important factor in the treatment of these cases. So essential is this agent in my opinion, that I have repeatedly refused to operate in private practice, when it was impossible to obtain a sufficient supply. At the hospital the pipes are tapped, and the steam is conducted through a rubber tube, attached to a frame on castors, and directed upon the throat of the patient. The severe cases are made to inhale it

[1] The source of the hemorrhage was from a wound in the vertebral artery; it did not recur, but the patient died of pleurisy in a week.

constantly, with the result of softening the secretion, quieting the cough, and often relieving the dyspnœa.

Neither medicated nor atomized fluids have been used of late for inhalation. The effects obtained from the use of warm steam seem to be as beneficial as they were when lime-water, carbolic acid, etc., were in vogue.

It is desirable that two efficient nurses should be in attendance, one to relieve the other, who have had special training, and who are able to remove and replace the outer canula, and clear out the trachea in an emergency. It is not safe to leave these patients in charge of inexperienced friends, while the overtasked nurse is getting her sleep. In short, the service of the sick-room should be quiet, regular, intelligent, and untiring.

In conclusion, I would briefly mention the following reasons for resorting to tracheotomy in membranous laryngitis.

The disease is always dangerous, and very often fatal.

The results obtained from medical treatment alone are extremely unsatisfactory.

Tracheotomy gives more relief, and saves more lives, than any other method of treatment known to the profession.

It seldom hastens death, and still more seldom causes it.

Finally, it affords the friends the great and lasting satisfaction of knowing that everything possible has been done for the patient.